

# PATENT ABSTRACTS OF JAPAN

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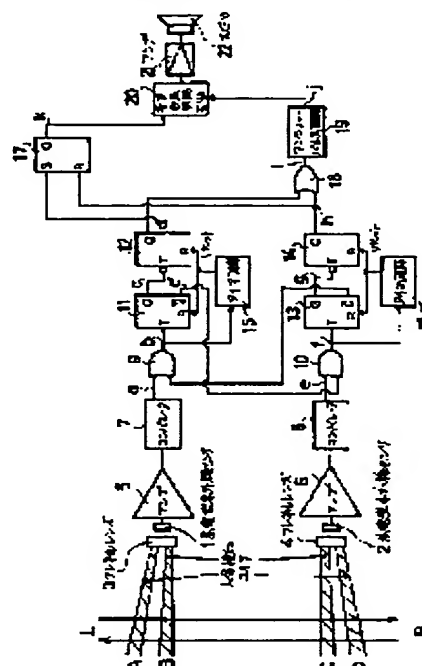
(22)Date of filing : 20.09.1991 (72)Inventor : NAKAMURA MASAHIRO

## (54) DEVICE FOR DISCRIMINATING HUMAN BODY MOVING DIRECTION

### (57)Abstract:

**PURPOSE:** To obtain a human body moving direction discriminating device by which a quick human body moving direction discrimination can be attained by preventing a malfunction.

**CONSTITUTION:** A voice synthesizing circuit 20 is operated according to the detected output of a pyroelectric infrared ray sensor which previously and successively detects the human body among pyroelectric infrared ray sensors 1 and 2 respectively having two human body detecting areas. And also, when one of the pyroelectric infrared ray sensors 1 and 2 previously detects the human body only in one human detecting area, and then the other successively detects the human body, the detected output of the pyroelectric infrared ray sensor which successively detects the human body afterwards is invalidated by AND gates 9 and 10, so that the malfunction can be prevented.



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## CLAIMS

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(57) [Claim(s)]

[Claim 1] When one side detects the body continuously in two or more body detection range among two body detection means by which each has two or more body detection range, and the two above-mentioned body detection means, A body migration direction distinction means to distinguish the migration direction of the body by which detected the body between the two above-mentioned body detection means, The information means which carries out information according to the body migration direction which carried out [ above-mentioned ] distinction in response to the distinction output from this body migration direction distinction means, The 1st detection control means which makes the detection output of the body detection means of another side a fixed time amount invalid when one side detects the body continuously in two or more body detection range between the two above-mentioned body detection means, The body migration direction distinction equipment characterized by providing the 2nd detection control means which makes the detection output of the body detection means of another side a request time amount invalid when one side of the two above-mentioned body detection means detects the body only in [ in two or more above-mentioned body detection range / body detection ] one.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the body migration direction distinction equipment which distinguishes the migration direction of the body with two body detection means to have two or more body detection range, respectively.

[0002]

[Description of the Prior Art] For example, it is installed in the entrance of a store and the body migration direction distinction equipment in the visitor alarm which generates "thank you" and voice, such as "welcome", according to people's in-and-out has two kinds of things as follows which carried out a configuration like drawing 5 .

[0003] The 1st thing distinguishes a direction, when an output comes out from two pyro infrared sensors 23 and 24 by a certain time difference, and the 2nd thing distinguishes a direction, the moment the output arose from either of the pyro infrared sensors 23 and 24.

[0004]

[Problem(s) to be Solved by the Invention] Since the 1st thing of the above cannot perform direction distinction unless both two pyro infrared sensors detect the body, when performing visitor information, since information may be performed after people go past, it will be in information.

[0005] Moreover, the 2nd thing of the above having un-arranged [ which malfunctions by the output of pyro infrared sensors 23 and 24 becoming indefinite ], when the migration body goes into duplication within the limits of the detection range of each sensor.

[0006] The purpose of this invention is to lose malfunction and enable the quick body migration direction distinction.

[0007]

[Means for Solving the Problem] When, as for this invention, one side detects the body continuously in two or more body detection range among two body detection means by which each has two or more body detection range, and the two above-mentioned body detection means, A body migration direction distinction means to distinguish the migration direction of the body by which detected the body

between the two above-mentioned body detection means, The information means which carries out information according to the body migration direction which carried out [ above-mentioned ] distinction in response to the distinction output from this body migration direction distinction means, The 1st detection control means which makes the detection output of the body detection means of another side a fixed time amount invalid when one side detects the body continuously in two or more body detection range between the two above-mentioned body detection means, When one side of the two above-mentioned body detection means detects the body only in [ in two or more above-mentioned body detection range / body detection ] one, the above-mentioned purpose is attained by establishing the 2nd detection control means which makes the detection output of the body detection means of another side a request time amount invalid.

[0008]

[Function] When one side of the two body detection means to have two or more body detection range detects the body continuously in two or more body detection range The migration direction of the body is distinguished by which detected the body between two body detection means with the body migration direction distinction means. When information according to the body migration direction distinguished with the information means in response to this distinction output is carried out and one side detects the body continuously in two or more body detection range between two body detection means The detection output of the body detection means of another side is made into a fixed time amount invalid by the 1st detection control means. When one side of the two body detection means detects the body only in [ in two or more body detection range / body detection ] one, the detection output of the body detection means of another side is made into an invalid by the 2nd detection control means. For this reason, when the body is detected, the information of migration of that body can carry out for whether being Sumiya.

[0009]

[Example] Hereafter, this invention is concretely explained based on one example shown in a drawing.

[0010] In drawing 1 , 1 and 2 are the pyro infrared sensors which constitute a body detection means, and it detects whether the body exists in body detection area, or it does not carry out. 3 and 4 are Fresnel lenses and are for dividing the body detection area of pyro infrared sensors 1 and 2 into A, and B, C and D, respectively. 5 and 6 are amplifier, amplifier 5 amplifies the output of a pyro infrared sensor 1, and amplifier 6 amplifies the output of a pyro infrared sensor 2. 7 and 8 are comparators, and when the output signal from amplifier 5 and 6 exceeds predetermined level, respectively, they produce an output. As for 9 and 10, the AND gate, and 11, 12, 13 and 14 are T-flip-flop circuits (only henceforth a flip-flop circuit), and whenever the standup of a pulse inputs flip-flop circuits 11 and 13 into T input terminal, they reverse an output, and whenever falling of a pulse inputs flip-flop circuits 12 and 14 into T input terminal, the trigger of them is carried out and they reverse an output. 15 and 16 are timer circuits, and a timer circuit 15 will reset flip-flop circuits 11 and 12, if a time check is started and the request time amount  $T_a$  (people consider as the time amount which the usual

walking speed takes crossing the body detection area C and D from the body detection area B, and call it the setup time  $T_a$  hereafter.) passes, when the AND gate 9 outputs "1." A timer circuit 16 will reset flip-flop circuits 13 and 14, if a time check is started and the request time amount  $T_b$  (people consider as the time amount which the usual walking speed takes crossing the body detection area B and A from the body detection area C, and call it the setup time  $T_b$  hereafter.) passes, when the AND gate 10 outputs "1." When another side continues and the body is detected after one side detected the body previously among pyro infrared sensors 1 and 2 only in one body detection area, the above-mentioned setup times  $T_a$  and  $T_b$  are set up in order that the AND gates 9 and 10 may make an invalid the detection output which carried out body detection continuously later. In addition, the 2nd detection control means consists of the AND gate 9, a flip-flop circuit 11, a timer circuit 15 and the AND gate 10, a flip-flop circuit 13, and a timer circuit 16, respectively. 17 is a flip-flop circuit which constitutes the body migration direction distinction means. 18 is the OR gate. 19 is the retriggerable single shot pulse circuit which constitutes the 1st detection control means, starts and outputs in an input the single shot pulse of fixed time amount (time amount which usual walking speed takes to people crossing all body detection area) width of face. "Welcome", if it is the electronic speech circuit which constitutes an information means, for example, the output of a flip-flop circuit 17 is "1" when the output of the single shot pulse circuit 19 is set to "1", 20 will compound the voice of "thank you", when the output of a flip-flop circuit 17 is "0." 21 is amplifier and 22 is a loudspeaker. First, from L, actuation in case the body moves to R is carried out to reference, and drawing 1 explains the timing chart of drawing 2. a, b, c, d, e, f, g, h, i, j, and k show the output signal of a, b, c, d, e, f, g, h, i, j, and k of drawing 1. It shall reach flip-flop circuit 11-14 now, and 17 shall be reset.

[0011] If the body is detected first in the body detection area A, the output more than predetermined level will come out from a pyro infrared sensor 1, it will be amplified with amplifier 5, a comparator 7 will be supplied, and the pulse P1 of drawing 2 a will occur from this output. This pulse P1 passes through the AND gate 9 like drawing 2 b, and the trigger of the flip-flop circuit 11 is carried out by that standup. Moreover, a timer circuit 15 also begins actuation with this output. [0012] Next, if the body is detected in the body detection area B, since the output more than predetermined level will come out from a pyro infrared sensor 1 again, it is amplified with amplifier 5, a comparator 7 is supplied, and the pulse P2 of drawing 2 a occurs from the output. This pulse P2 passes through the AND gate 9 like drawing 2 b, the trigger of the flip-flop circuit 11 is carried out by that standup, that output c falls, the trigger of the flip-flop circuit 12 is carried out by this falling, and that output d is set to "1" by it. When d is set to "1", the trigger of the flip-flop circuit 17 is carried out, and the output k is set to "1." Moreover, the output i of the OR gate 18 starts, the trigger of the single shot pulse circuit 19 is carried out, and the single shot pulse P3 of fixed time amount width of face of drawing 2 j occurs from the output. At this time, the electronic speech circuit 20 has inputted "1" from the flip-flop circuit 17, by this standup of P3, it reads the input "1" from a flip-flop circuit 17, compounds the voice of "welcome",

amplifies it with amplifier 21, and reports voice from a loudspeaker 22.

[0013] Then, if a pyro infrared sensor 2 detects the body in the body detection area C when the body moves, the output more than predetermined level will come out from a pyro infrared sensor 2, it will be amplified with amplifier 6, a comparator 8 will be supplied, and the pulse P4 of drawing 2 e will occur from this output. This pulse P4 passes through the AND gate 10 like drawing 2 f, and the trigger of the flip-flop circuit 13 is carried out by that standup. Moreover, a timer circuit 16 also begins actuation with this output.

[0014] And if the body is detected in the body detection area D, since the output more than predetermined level will come out from a pyro infrared sensor 2 again, it is amplified with amplifier 6, a comparator 8 is supplied, and the pulse P5 of drawing 2 e occurs from the output. This pulse P5 passes through the AND gate 10 like drawing 2 f, the trigger of the flip-flop circuit 13 is carried out by that standup, that output g falls, the trigger of the flip-flop circuit 14 is carried out by this falling, and that output h is set to "1" by it. Since the trigger of the flip-flop circuit 17 is carried out when h is set to "1", an output k is set to "0." Moreover, although the output i of the OR gate 18 starts and the trigger of the single shot pulse circuit 19 is carried out, since the single shot pulse circuit 19 is outputting the single shot pulse P3, at this time, a standup does not happen to an output j, the trigger of the electronic speech circuit 20 is not carried out, and it does not output an electronic speech circuit 20.

[0015] That is, "welcome" will be reported when the body moves to R from L by drawing 1 .

[0016] Moreover, flip-flop circuits 11 and 12 are reset by the output of a timer circuit 15, flip-flop circuits 13 and 14 are reset by the output of a timer circuit 16, and it returns to an initial state.

[0017] Next, from R, the timing chart of drawing 3 is made reference and drawing 1 explains the case where the body moves to L. a, b, c, d, e, f, g, h, i, j, and k show the output signal of a, b, c, d, e, f, g, h, i, j, and k of drawing 1 . It shall reach flip-flop circuit 11-14 now, and 17 shall be reset.

[0018] If the body is detected first in the body detection area D, the output more than predetermined level will come out from a pyro infrared sensor 2, it will be amplified with amplifier 6, a comparator 8 will be supplied, and the pulse P6 of drawing 3 e will occur from this output. This pulse P6 passes through the AND gate 10 like drawing 3 f, and the trigger of the flip-flop circuit 13 is carried out by that standup. Moreover, a timer circuit 16 also begins actuation with this output.

[0019] Next, if the body is detected in the body detection area C, since the output more than predetermined level will come out from a pyro infrared sensor 2 again, it is amplified with amplifier 6, a comparator 8 is supplied, and the pulse P7 of drawing 3 e occurs from the output. This pulse P7 passes through the AND gate 10 like drawing 3 f, the trigger of the flip-flop circuit 13 is carried out by that standup, that output g falls, the trigger of the flip-flop circuit 14 is carried out by this falling, and that output h is set to "1" by it. Since the trigger of the flip-flop circuit 17 is carried out when h is set to "1", an output k is set to "0." Moreover, the output i of the OR gate 18 starts, the trigger of the single shot pulse circuit 19 is carried out, and the single shot pulse P8 of fixed time amount width of face

of drawing 3 j generates it from the output. At this time, the electronic speech circuit 20 has inputted "0" from the flip-flop circuit 17, by this standup of P8, it reads the input "0" from a flip-flop circuit 17, compounds the voice of "thank you", amplifies it with amplifier 21, and reports voice from a loudspeaker 22.

[0020] Then, if a pyro infrared sensor 1 detects the body in the body detection area B when the body moves, the output more than predetermined level will come out from a pyro infrared sensor 1, it will be amplified with amplifier 5, a comparator 7 will be supplied, and the pulse P9 of drawing 3 a will occur from this output. This pulse P9 passes through the AND gate 9 like drawing 3 b, and the trigger of the flip-flop circuit 11 is carried out by that standup. Moreover, a timer circuit 15 also begins actuation with this output.

[0021] And if the body is detected in the body detection area A, since the output more than predetermined level will come out from a pyro infrared sensor 1 again, it is amplified with amplifier 5, a comparator 7 is supplied, and the pulse P10 of drawing 3 a occurs from the output. This pulse P10 passes through the AND gate 9 like drawing 3 b, the trigger of the flip-flop circuit 11 is carried out by that standup, that output c falls, the trigger of the flip-flop circuit 12 is carried out by this falling, and that output d is set to "1" by it. Since the trigger of the flip-flop circuit 17 is carried out when d is set to "1", an output k is set to "1." Moreover, although the output i of the OR gate 18 starts and the trigger of the single shot pulse circuit 19 is carried out, since the single shot pulse circuit 19 is outputting the single shot pulse P8, at this time, a standup does not happen to an output j, the trigger of the electronic speech circuit 20 is not carried out, and it does not output an electronic speech circuit 20.

[0022] That is, "thank you" will be reported when the body moves to R from L by drawing 1 .

[0023] When the body invades from the detection area front and it finally passes aslant, in drawing 1 , the actuation when detecting and detecting the body continuously in the body detection area B first in the body detection area C and D is explained with reference to the timing chart of drawing 4 . a, b, c, c', and d, e, f, g, h, i, j and k show the output signal of a, b and c of drawing 1 , c', and d, e, f, g, h, i, j and k. It shall reach flip-flop circuit 11-14 now, and 17 shall be reset.

[0024] If the body is detected in the body detection area B, the output more than predetermined level will come out from a pyro infrared sensor 1, it will be amplified with amplifier 5, a comparator 7 will be supplied, and the pulse P11 of drawing 4 a will occur from this output. Like drawing 4 b, it passes through the AND gate 9, the trigger of the flip-flop circuit 11 is carried out by that standup, and this pulse P11 is output c'. It is set to "0." Moreover, a timer circuit 15 also begins actuation with this output. Output c' The AND gate 10 is closed by being set to "0." Between the setup times Ta of a timer circuit 15 (time amount which the usual walking speed takes to people crossing the body detection area C and D from the body detection area B), since it is not reset, the flip-flop circuit 11 has closed the AND gate 10 here in the meantime. Therefore, since this output cannot pass along the AND gate 10 even if a pyro infrared sensor 2 detects the body in the body detection area C and D and it outputs more than predetermined level, the output i of the OR gate 18 does not start, since the trigger of the single shot



pulse circuit 19 is not carried out, an electronic speech circuit 20 does not operate and voice information is not performed.

[0025] On the contrary, the actuation when detecting and detecting the body continuously in the body detection area C first in drawing 1 in the body detection area B and A Since the AND gate 9 closes by the flip-flop circuit 13 like the above Since this output cannot pass along the AND gate 9 even if a pyro infrared sensor 2 detects the body in the body detection area B and A and it outputs more than predetermined level, the output i of the OR gate 18 does not start. Since the trigger of the single shot pulse circuit 19 is not carried out, an electronic speech circuit 20 does not operate and voice information is not performed.

[0026]

[Effect of the Invention] As explained in full detail above, since the body migration direction distinction equipment of this invention distinguishes the migration direction and carries out information according to the distinction direction when the body is continuously detected in two or more body detection range which can be set for one body detection means, the quick body migration direction distinction of it is attained. Therefore, when it uses for what utters the voice according to receipts and payments at the entrance of a store etc., for example, voice can be uttered, without being behind. And after the body detection by one body detection means, since detection of the body detection means of another side between fixed time amount is made into an invalid, it can lose un-arranging [ of performing two different information to one person's passage ]. Moreover, since a detection output is not produced as the migration direction distinction being impossible when the body is not continuously detected in all the body detection range in one body detection means, malfunction can be lost.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the block circuit diagram of one example of this invention.

[Drawing 2] It is a timing chart for explanation of drawing 1 of operation.

[Drawing 3] It is a timing chart for explanation of drawing 1 of operation.

[Drawing 4] It is a timing chart for explanation of drawing 1 of operation.

[Drawing 5] It is the block circuit diagram of conventional body migration direction distinction equipment.

[Description of Notations]

1 Two Body detection means

9, 11, 15 2nd detection control means

10, 13, 16 2nd detection control means

17 The Body Migration Direction Distinction Means

19 1st Detection Control Means

20 Information Means

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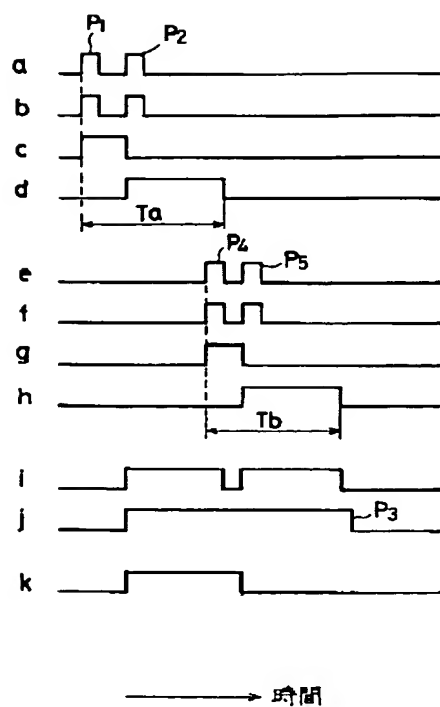
**DRAWINGS**

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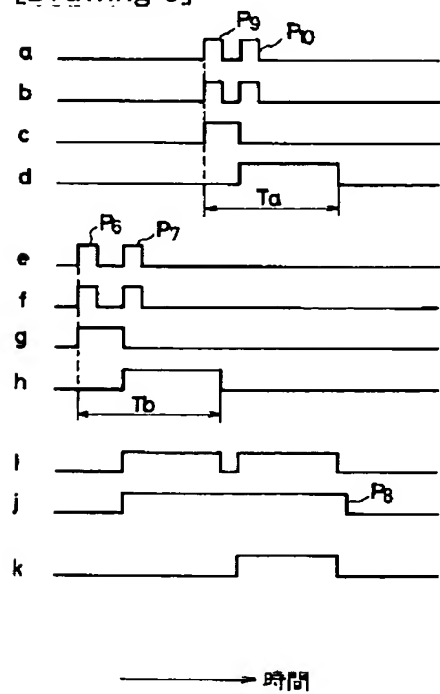
[Drawing 1]



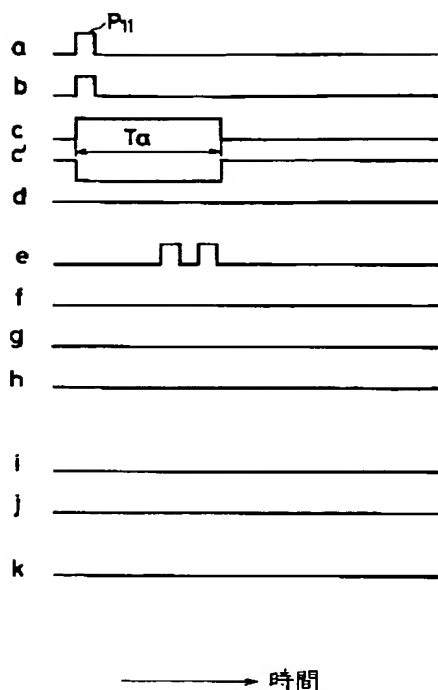
[Drawing 2]



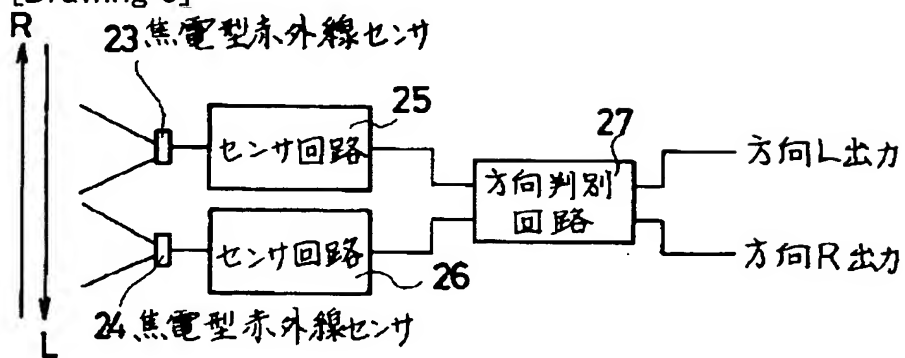
[Drawing 3]



[Drawing 4]



[Drawing 5]



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